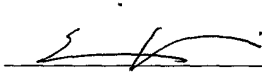


FORM PTO-1390 (REV 10-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEYS DOCKET NUMBER 0819-416
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.51) 09/744595
INTERNATIONAL APPLICATION NO. PCT/JP99/04083	INTERNATIONAL FILING DATE: July 28, 1999	PRIORITY DATE CLAIMED: July 29, 1998		
TITLE OF INVENTION REPRODUCING APPARATUS AND RECORDING MEDIUM				
APPLICANT(S) FOR DO/EO/US Kojiro OKAMOTO, Hiromichi SHIMADA, Yoshihisa FUKUSHIMA				
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:				
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)). 4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (PCT Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)). <ol style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). 				
Items 11 to 16 below concern document(s) or information included:				
11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.				
12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.				
13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.				
14. <input type="checkbox"/> A substitute specification.				
15. <input type="checkbox"/> A change of power of attorney and/or address letter.				
16. <input checked="" type="checkbox"/> Other items or information: Five Sheets of Formal Drawings (Figures 1-8) International Search Report International Preliminary Examination Report				

U.S. APPLICATION NO. (If known, see 37 CFR 1.50) 09/744595		INTERNATIONAL APPLICATION NO PCT/JP99/04083		ATTORNEYS DOCKET NUMBER 0819-416	
17. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492(a)(1) - (5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO #1000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(3)) paid to USPTO \$710.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				CALCULATIONS	PTO USE ONLY
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	11 - 20 =	0	X \$18.00	\$	
Independent claims	2 - 3 =	0	X \$80.00	\$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$860.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$	
SUBTOTAL =				\$860.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$40.00	
TOTAL FEES ENCLOSED =				\$900.00	
				Amount to be refunded:	\$
				Charged:	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$900.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-2380. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO					
 SIGNATURE					
Eric J. Robinson NAME					
38,285 REGISTRATION NUMBER					

09/744595

500 Rec'd PCT/PTO 2 6 JAN 2001

- 1 -

Docket: 0819-416

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re New National Phase Application of)
Kojiro OKAMOTO et al.)
International Application No. PCT/JP99/04083) Attn: US/DO/EO
International Filing Date: July 28, 1999)
For: REPRODUCING APPARATUS)
AND RECORDING MEDIUM)

PRELIMINARY AMENDMENT

Honorable Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Please preliminarily amend the subject application as follows:

IN THE CLAIMS:

Please amend claims 1 and 3 as follows:

1. (Amended) A disk-shaped recording medium comprising a primary recording region and a secondary recording region which is located on the side of an internal periphery of said primary recording region,

wherein said primary recording region has a track which wobbles at a first pitch, and along which a user is able to record a date signal; and

wherein said secondary recording region has a track which wobbles at a second pitch different from said first pitch or does not wobble, and along which a signal representative of control information is already prerecorded in the form of information pits at the time of the manufacture of said recording medium.

3. (Amended) The recording medium of claim 1, wherein said control information in said secondary recording region includes an identification information item required at the time of reproduction and representative of the type of said recording medium.

REMARKS

Claims 1 and 3 have been amended reflecting the Article 19 amendment filed in the international stage.

Examination on the merits is requested.

Respectfully submitted,



Eric J. Robinson

Registration No. 38,285

NIXON PEABODY LLP

8180 Greensboro Drive, Suite 800

McLean, Virginia 22102

(703) 790-9110

DESCRIPTION

REPRODUCING APPARATUS AND RECORDING MEDIUM

TECHNICAL FIELD

5 This invention relates to a disk-shaped recording medium into which a user is able to record a data signal and to a reproducing apparatus for reproducing main data recorded on such a recording medium.

BACKGROUND ART

10 As one type of conventional mass-storage recording medium, there are optical disks known as DVDs (Digital Video Disks or Digital Versatile Disks). A DVD-ROM (Read Only Memory) is a reproduction-only type optical disk on which video and audio data of a movie, music, and the like and data such as
15 representing a computer program have been recorded at the time of its manufacture. A DVD-R (Recordable) is a write-once type optical disk onto which a user is able to record a data signal. In the following description, the DVD-ROM is referred to as a ROM disk and the DVD-R is referred to as an R disk.

20 If copying of main data recorded on a ROM disk into an R disk is free to carry out, this may cause various problems against copyright laws. Generally, to provide a copy protection scheme, at the time of the manufacture of a ROM disk its main data is encrypted before being recorded in a
25 primary recording region of the ROM disk and key information for decrypting encryption of the main data is recorded in a secondary recording region of the ROM disk located on the

side of an internal periphery of the primary recording region. In addition, it is possible to take other countermeasures against unauthorized copying. For example, at the time of the manufacture of an R disk, invalid key information is recorded in a secondary recording region of that R disk and identification information indicating that the disk concerned is not a ROM disk but an R disk is recorded also in the secondary recording region. However, these copy protection schemes are considered not to be thoroughgoing. If encrypted main data on a ROM disk is copied into a primary recording region of an R disk, together with its control information including a key information item and an identification information item indicating that the disk concerned is a ROM disk, it is likely that the copied main data is reproduced by the use of the copied control information in a conventional DVD reproducing apparatus. This is due to the fact that if false control information exists in a primary recording region of an R disk this causes a conventional DVD reproducing apparatus to mistakenly accept such control information prior to seeking out genuine control information in a secondary recording region of the R disk.

DISCLOSURE OF INVENTION

Accordingly, an object of the present invention is to make it possible to ignore, even when false control information is copied into a primary recording region of a recording medium into which a user is able to record data signals, such false control information, for seeking out

genuine control information in a secondary recording region of the recording medium.

In order to accomplish the object, the present invention provides a disk-shaped recording medium which comprises a primary recording region and a secondary recording region which is located on the side of an internal periphery of the primary recording region. The primary recording region has a track which wobbles at a first pitch, and along which a user is able to record a data signal. On the other hand, the secondary recording region has a track which wobbles at a second pitch different from the first pitch or does not wobble, and along which a signal representative of control information is already prerecorded at the time of the manufacture of the recording medium. Preferably, the control information in the secondary recording region includes an invalid key information item for inhibiting, when encrypted main data is copied into the primary recording region, reproduction of the main data. Further, it is preferred that the control information in the secondary recording region includes an identification information item representative of the type of the recording medium.

Further, the present invention provides a first reproducing apparatus for the reproduction of main data recorded in the primary recording region with a wobbling track of the foregoing recording medium, the reproducing apparatus comprising means for spinning the recording medium at a constant linear velocity; a pickup for reading a signal

from the recording medium under rotation; means by which a signal read position by the pickup follows a track of the recording medium; means for generating a tracking error signal from an output of the pickup; means for shifting the pickup in a direction toward an internal periphery of the recording medium until the pickup reaches a specific point of the secondary recording region at which the tracking error signal no longer contains a signal component having a frequency which is determined by the first pitch relating to the wobbling of the track in the primary recording region and the constant linear velocity, so that even when false control information is copied into the primary recording region the false control information is ignored; and means for starting reproduction of the main data recorded in the primary recording region according to the control information in the secondary recording region represented by an output of the pickup shifted to the point of the secondary recording region.

Further, the present invention provides a second reproducing apparatus capable of providing an effective copy protection scheme even when a recording medium without a wobbling track in its primary recording region is mounted thereto. The second reproducing apparatus, which is for reproducing, from a disk-shaped recording medium comprising (a) a primary recording region into which a user is able to record a data signal and (b) a secondary recording region which is located on the side of an internal periphery of the primary recording region and into which a signal

representative of control information is already prerecorded at the time of the manufacture of the recording medium, main data recorded in the primary recording region, comprises a pickup for reading a signal from the recording medium; means for shifting the pickup in a direction toward an internal periphery of the recording medium until the pickup reaches its shift limit point; and means for starting reproduction of the main data recorded in the primary recording region according to the control information in the secondary recording region obtained finally from an output of the pickup during shifting of the pickup, so that even when false control information is copied into the primary recording region the false control information is ignored.

According to the first and the second reproducing apparatus of the present invention, even when false control information is copied into a primary recording region of a recording medium into which a user is able to record data signals, it is possible to seek out genuine control information in a secondary recording region of the recording medium. This provides an effective copy protection scheme. For example, control information in the secondary recording region includes an invalid key information item for inhibition of reproduction of encrypted main data, so that when main data copied and recorded in the primary recording region is encrypted its reproduction can be canceled according to the invalid key information item. Further, control information in the secondary recording region

includes an identification information item representative of the type of the recording medium, so that when the identification information item indicates that recording of a data signal into the primary recording region by a user is possible and, in addition, main data recorded in the primary recording region is encrypted, it is possible to cancel reproduction of the main data. However, in the case main data recorded in the primary recording region is not encrypted, it is possible to continue reproduction of the main data.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a perspective view of an optical disk showing one example of a recording medium according to the present invention.

Figure 2 is a partly enlarged plan view of a track in a primary recording region in Figure 1.

Figure 3 is a partly enlarged plan view of a track in a secondary recording region in Figure 1.

Figure 4 is a diagram showing a variation of Figure 3.

Figure 5 is a circuit block diagram showing a construction example of a DVD reproducing apparatus according to the present invention, with an optical disk of Figure 1 mounted thereto.

Figure 6 is a waveform diagram of a tracking error signal when the primary recording region in Figure 1 is being scanned with a light beam.

Figure 7 is a conceptual diagram showing one example of a data structure in the optical disk of Figure 1.

Figure 8 is a circuit block diagram showing a construction example of another DVD reproducing apparatus of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Embodiments of the present invention will be described with reference to the accompanying drawings.

Figure 1 shows an optical disk which is one example of a recording medium according to the present invention. The optical disk 10 of Figure 1 is a DVD-R, i.e., an R disk. The optical disk 10 comprises a clamping region defined around the periphery of a center hole of the optical disk 10 and, in an area of the optical disk 10 not occupied by the clamping region, a primary recording region 20 and a secondary recording region 30 located on the side of an internal periphery of the primary recording region 20.

Figure 2 is a partly enlarged plan view of a track in the primary recording region 20 in Figure 1. The primary recording region 20 has a track 21 formed of a groove which wobbles at a pitch P_1 , and a user is able to record a data signal by formation of information pits 22 along the track 21. The degree of wobbling of the track 21 can be expressed by the number of wobbles (N) with respect to a prescribed track length (L). For example, the number of wobbles is eight for a prescribed track length of 218.7 μm . In other words, the pitch P_1 of the track 21 is about 27.3 μm .

Figure 3 is a partly enlarged plan view of a track in the secondary recording region 30 in Figure 1. The secondary recording region 30 has a track 31 formed of a groove which wobbles at a pitch P2 different from the wobble pitch P1 of the track 21 in the primary recording region 20, and information pits 32 are formed along the track 31 to record a signal representative of control information at the time of the manufacture of the R disk 10. The control information in the secondary recording region 30 includes an invalid key information item for inhibiting, when encrypted main data is copied into the primary recording region 20, reproduction of the main data and an identification information item indicating that the disk 10 is an R disk. In the example shown in Figure 3, the wobble pitch P2 of the track 31 is set greater than the wobble pitch P1 of the track 21.

Reference is now made to Figure 4 which shows a variation of Figure 3. It suffices for the track 31 in the secondary recording region 30 to be distinguishable from the wobbling track 21 in the primary recording region 20, so that the track 31 does not necessarily have to wobble, as not all of the tracks in a DVD-ROM (i.e., a ROM disk) wobble.

Figure 5 is a circuit block diagram illustrating an construction example of a DVD reproducing apparatus according to the present invention with the R disk 10 of Figure 1 mounted thereto. As will be described later, a ROM disk may be mounted to the DVD reproducing apparatus of Figure 5 instead of the R disk 10.

The DVD reproducing apparatus of Figure 5 comprises a spindle motor 41 for spinning the R disk 10, an optical pickup 42 for scanning the R disk 10 under rotation with a light beam and reading a signal from the R disk 10, and a slider 43 for shifting the optical pickup 42 in the radial direction of the R disk 10. The apparatus of Figure 5 further includes an amplifier 50, a mechanism controller part 60, a wobble detector circuit 70, a demodulator circuit 80, and a system controller circuit 90. The mechanism controller part 60 is constructed of a rotary servo circuit 61, a shift controller circuit 62, a tracking servo circuit 63, and a focus servo circuit 64.

The rotary servo circuit 61 controls the number of revolutions of the spindle motor 41 according to instructions from the system controller circuit 90 so that the R disk 10 spins at a constant linear velocity (CLV). The shift controller circuit 62 controls the slider 43 according to instructions from the system controller circuit 90 so that the optical pickup 42 is shifted in the radial direction of the R disk 10. The amplifier 50 amplifies an output of the optical pickup 42. In addition to this, the amplifier 50 has a function of performing addition/subtraction operations on a plurality of sensor signals forming an output of the optical pickup 42 thereby to generate a tracking error signal Ste and a focus error signal Sfe and a function of binarizing a modulated output of the optical pickup 42 thereby to generate a data detection signal Sdt . The tracking error signal Ste is

provided to the tracking servo circuit 63 and to the wobble detector circuit 70, the focus error signal Sfe is provided to the focus servo circuit 64, and the data detection signal Sdt is provided to the demodulator circuit 80. The tracking servo circuit 63 controls the optical pickup 42 so that the position at which the optical pickup 42 reads a signal (i.e., the light beam irradiation point) follows the tracks 21 and 31 of the R disk 10, thereby to reduce the tracking error signal Ste. The wobble detector circuit 70 detects a signal for a frequency component which is contained in the tracking error signal Ste due to the wobbling of the track 21 and/or the track 31 and the detection result is sent to the system controller circuit 90. The focus servo circuit 64 controls vertical movement of the optical pickup 42 so that a light beam is focused to the R disk 10, thereby to reduce the focus error signal Sfe. The demodulator circuit 80 is a circuit operable to demodulate the data detection signal Sdt to obtain main data and control information. The control information thus obtained is sent to the system controller circuit 90. The system controller circuit 90 is a circuit operable to control the entirety of the DVD reproducing apparatus of Figure 5.

Figure 6 is a waveform diagram of the tracking error signal Ste when the primary recording region 20 in Figure 1 is being scanned with a light beam. The tracking error signal Ste contains a signal component having a wobble frequency F1 according to the wobble pitch P1 of the track 21 in the

primary recording region 20. This is because the frequency characteristic of the tracking servo circuit 63 is set such that the tracking servo circuit 63 does not have a gain sufficient enough to enable the light beam to follow the wobbling track 21 at the wobble frequency F1. The wobble frequency F1 can be defined by the number of wobbles per second when the wobbling track 21 is scanned at a constant linear velocity V, as expressed below.

$$F1 = (N/L) \times V = V/P1$$

In other words, the wobble frequency F1 is determined by the wobble pitch P1 of the track 21 and the constant linear velocity V. Here, if $V = 3.84 \text{ m/s}$, then $F1 = 140 \text{ kHz}$ for the above-described example (in which $L = 218.7 \text{ }\mu\text{m}$ and $N = 8$).

The tracking error signal Ste when the secondary recording region 30 is being scanned with a light beam contains a signal component having a wobble frequency F2 lower than the wobble frequency F1 if the track 31 in the secondary recording region 30 wobbles at the pitch P2 ($P2 > P1$) as shown in Figure 3. If the track 31 in the secondary recording region 30 does not wobble as shown in Figure 4, this enables the light beam to accurately follow the track 31 and, as a result, the tracking error signal Ste becomes zero.

The system controller circuit 90 in Figure 5 issues instructions to the shift controller circuit 62, thereby to make it possible to shift the optical pickup 42 in a direction toward an internal periphery of the R disk 10 until

the optical pickup 42 reaches a specific point of the secondary recording region 30 at which the tracking error signal Ste no longer contains a signal component having the wobble frequency F1, so that even when false control information is copied into the primary recording region 20 such false control information is ignored. Further, the system controller circuit 90 issues instructions to the demodulator circuit 80, thereby to make it possible to start, according to control information in the secondary recording region 30 represented by an output of the optical pickup 42 shifted up to the point of the secondary recording region 30, reproduction of main data recorded in the primary recording region 20. In the case main data recorded in the primary recording region 20 of the R disk 10 is not encrypted, reproduction of the main data will continue, so that the main data recorded on the R disk 10 can be reproduced by the DVD reproducing apparatus of Figure 5.

Reference is now made to Figure 7 which shows one example of a data structure in the R disk 10 of Figure 1. More detailedly, Figure 7 shows a state in which encrypted main data DATA-ROM on a ROM disk (not shown) is copied into the primary recording region 20 of the R disk 10 together with control information including a key information item KEY-ROM on the ROM disk and an identification information item ID-ROM indicating that the disk concerned is a ROM disk. As described above, the main data DATA-ROM, the false control information items KEY-ROM and ID-ROM are recorded along the

track 21 which wobbles at the pitch P1 in the primary recording region 20. On the other hand, control information including an invalid key information item KEY-R for inhibition of reproduction of the copied main data DATA-ROM and an identification information item ID-R indicating that the disk 10 is an R disk is recorded at the time of the manufacture of the R disk 10. These genuine control information items KEY-R and ID-R are recorded along the track 31 in the secondary recording region 30 which wobbles at the pitch P2 or does not wobble.

The operation of the DVD reproducing apparatus of Figure 5 with the R disk 10 having a data structure as shown in Figure 7 mounted thereto will be described. The initial position of the optical pickup 42 is the read position of the main data DATA-ROM. The initial position of the optical pickup 42 is the position where the rotary servo circuit 61, the tracking servo circuit 63, and the focus servo circuit 64 start operating. The system controller circuit 90 issues instructions to the shift controller circuit 62 so as to shift the optical pickup 42 in a direction toward the internal periphery of the R disk 10 until certain control information is found out. In this way, the optical pickup 42 arrives at the false control information items KEY-ROM and ID-ROM. However, the wobble detector circuit 70 detects a signal component having the wobble frequency F1 in the tracking error signal Ste and the detection result is sent to the system controller circuit 90. As a result, the system

controller circuit 90 issues instructions to the shift controller circuit 62 so that the optical pickup 42 is further shifted toward the internal periphery of the R disk 10 until the next control information is found out. In this way, the optical pickup 42 finally arrives at the genuine control information items KEY-R and ID-R. The tracking error signal Ste at this point of time does not contain any signal component having the wobble frequency F1, so that these genuine control information items KEY-R and ID-R are accepted by the system controller circuit 90. Thereafter, the system controller circuit 90 issues to the shift controller circuit 62 instructions so that the optical pickup 42 is shifted in a direction toward the external periphery of the R disk 10 to the location of the main data DATA-ROM.

It is possible to tell whether the main data is encrypted or not from a flag which is located at the head of each divided section of the main data. In the example shown in Figure 7, the main data DATA-ROM is encrypted, so that the demodulator circuit 80 is unable to decrypt encryption of the main data even if the invalid key information item KEY-R is used. In other words, the system controller circuit 90 is able to cancel, when main data recorded in the primary recording region 20 is encrypted, reproduction of the main data by the demodulator circuit 80 according to the invalid key information item KEY-R. In this case, recording of the identification information item ID-R into the secondary recording region 30 may be omitted.

Further, the identification information item ID-R may be utilized for copy protection. That is to say, the system controller circuit 90 is able to cancel, when the identification information item indicates that the disk 10
5 concerned is an R disk and, in addition, the main data recorded in the primary recording region 20 is encrypted, reproduction of the main data by the demodulator circuit 80. In this case, recording of the invalid key information item KEY-R into the secondary recording region 30 may be omitted.

10 As described above, it is possible to mount to the DVD reproducing apparatus of Figure 5 a ROM disk in place of the R disk 10. Here, encrypted main data is recorded in a primary recording region of the ROM disk, and control information including a key information item for decrypting the
15 encryption and an identification information item indicating that the disk concerned is a ROM disk is recorded in a secondary recording region of the ROM disk. However, none of the tracks in the primary and secondary recording regions wobbles. The DVD reproducing apparatus of Figure 5
20 facilitates seeking out genuine control information in the secondary recording region of the ROM disk. The tracking error signal Ste at this point in time does not contain any signal component having the wobble frequency F1, so that the genuine control information found out is accepted by the
25 system controller circuit 90. The demodulator circuit 80 is able to decrypt encryption of the main data by the use of the genuine key information.

As described above, according to the DVD reproducing apparatus of Figure 5, it is possible to seek out genuine control information, even when an R disk having a primary recording region with false control information copied
5 thereinto is mounted, or even when a conventional ROM disk is mounted. This provides an effective copy protection scheme and there is no interference with normal reproduction.

Reference is made to Figure 8 which illustrates a construction example of a DVD reproducing apparatus according to the present invention. In Figure 8, reference numeral 10
10 denotes an R disk having a primary recording region into which a user is able to record a data signal and a secondary recording region which is located on the side of the internal periphery of the primary recording region and into which a
15 signal representative of control information is already prerecorded at the time of the manufacture of the R disk 10. The R disk 10 does not necessarily have a wobbling track in the primary recording region.

The DVD reproducing apparatus of Figure 8 is provided
20 with a search controller circuit 75 in place of the wobble detector circuit 70 of Figure 5. The search controller circuit 75 issues to the shift controller circuit 62 instructions thereby to shift the optical pickup 42 toward the internal periphery of the R disk 10 until the optical
25 pickup 42 reaches its shift limit point, for searching the R disk 10 for every control information recorded therein. That the optical pickup 42 is shifted to the shift limit point is

detected by the system controller circuit 90, for example, from the fact that a signal read by the optical pickup 42 stays unchanged. At this point in time, the system controller circuit 90 instructs the search controller circuit 75 not to
5 conduct further searches. Further, it is arranged such that the system controller circuit 90 starts reproduction of the main data recorded in the primary recording region according to the control information in the secondary recording region obtained finally from an output of the optical pickup 42
10 during shifting of the optical pickup 42, so that even when false control information is copied into the primary recording region of the R disk 10 such false control information is ignored.

According to the DVD reproducing apparatus of Figure 8,
15 as in the case of Figure 5, even when an R disk having a primary recording region with false control information copied therein is mounted, or even when a conventional ROM disk is mounted, it is possible to seek out genuine control information. This provides an effective copy protection
20 scheme and there is no interference with normal reproduction.

INDUSTRIAL APPLICABILITY

According to the present invention, even when false control information is copied into a primary recording region of a recording medium into which a user is able to record
25 data signals, such false control information is ignored and genuine control information in a secondary recording region of the recording medium is found out. This accordingly

provides an improved DVD reproducing apparatus capable of providing an effective copy protection scheme.

CLAIMS

1. A disk-shaped recording medium comprising a primary recording region and a secondary recording region which is located on the side of an internal periphery of said primary
5 recording region,

wherein said primary recording region has a track which wobbles at a first pitch, and along which a user is able to record a data signal; and

wherein said secondary recording region has a track which
10 wobbles at a second pitch different from said first pitch or does not wobble, and along which a signal representative of control information is already prerecorded at the time of the manufacture of said recording medium.

2. The recording medium of claim 1,

15 wherein said control information in said secondary recording region includes an invalid key information item for inhibiting, when encrypted main data is copied into said primary recording region, reproduction of said main data.

3. The recording medium of claim 1,

20 wherein said control information in said secondary recording region includes an identification information item representative of the type of said recording medium.

4. A reproducing apparatus for the reproduction of main data recorded in said primary recording region of said claim
25 1 recording medium, said reproducing apparatus comprising:

means for spinning said recording medium at a constant linear velocity;

a pickup for reading a signal from said recording medium under rotation;

means by which a signal read position by said pickup follows said tracks of said recording medium;

5 means for generating a tracking error signal from an output of said pickup;

means for shifting said pickup in a direction toward an internal periphery of said recording medium until said pickup reaches a specific point of said secondary recording region at which said tracking error signal no longer contains a signal component having a frequency which is determined by said first pitch relating to the wobbling of said track in said primary recording region and said constant linear velocity, so that even when false control information is copied into said primary recording region said false control information is ignored; and

10
15

means for starting reproduction of said main data recorded in said primary recording region according to said control information in said secondary recording region represented by an output of said pickup shifted to said point of said secondary recording region.

20

5. The reproducing apparatus of claim 4,

wherein said control information in said secondary recording region includes an invalid key information item for inhibiting, when encrypted main data is copied into said primary recording region, reproduction of said main data; and

25

wherein said reproducing apparatus further comprises means for canceling, when main data recorded in said primary recording region is encrypted, reproduction of said main data according to said invalid key information item.

5 6. The reproducing apparatus of claim 4,

wherein said control information in said secondary recording region includes an identification information item representative of the type of said recording medium; and

wherein said reproducing apparatus further comprises
10 means for canceling, when said identification information item indicates that recording of a data signal into said primary recording region by a user is possible and, in addition, main data recorded in said primary recording region is encrypted, reproduction of said main data.

15 7. The reproducing apparatus of claim 4 further comprising means for continuing, when main data recorded in said primary recording region is not encrypted, reproduction of said main data.

8. A reproducing apparatus for reproducing, from a disk-
20 shaped recording medium comprising (a) a primary recording region into which a user is able to record a data signal and (b) a secondary recording region which is located on the side of an internal periphery of said primary recording region and into which a signal representative of control information is
25 already prerecorded at the time of the manufacture of said recording medium, main data recorded in said primary recording region,

said reproducing apparatus comprising:

a pickup for reading a signal from said recording medium;

means for shifting said pickup in a direction toward an
internal periphery of said recording medium until said pickup
5 reaches its shift limit point; and

means for starting reproduction of said main data
recorded in said primary recording region according to said
control information in said secondary recording region
obtained finally from an output of said pickup during
10 shifting of said pickup, so that even when false control
information is copied into said primary recording region said
false control information is ignored.

9. The reproducing apparatus of claim 8,

wherein said control information in said secondary
15 recording region includes an invalid key information item for
inhibiting, when encrypted main data is copied into said
primary recording region, reproduction of said main data; and

wherein said reproducing apparatus further comprises
means for canceling, when main data recorded in said primary
20 recording region is encrypted, reproduction of said main data
according to said invalid key information item.

10. The reproducing apparatus of claim 8,

wherein said control information in said secondary
recording region includes an identification information item
25 representative of the type of said recording medium; and

wherein said reproducing apparatus further comprises
means for canceling, when said identification information

item indicates that recording of a data signal into said primary recording region by a user is possible and, in addition, main data recorded in said primary recording region is encrypted, reproduction of said main data.

- 5 11. The reproducing apparatus of claim 8 further comprising means for continuing, when main data recorded in said primary recording region is not encrypted, reproduction of said main data.

ABSTRACT

There is provided a scheme for copy protection when encrypted main data in a DVD-ROM which is a reproduction-only type optical disk is copied, together with control information including a key information item for decryption in the DVD-ROM and an identification information item indicating that the disk concerned is of a reproduction-only type, into a primary recording region of a DVD-R which is a write-once optical disk. To this end, recorded in a secondary recording region of a DVD-R is control information including an invalid key information item and an identification information indicating that the disk concerned is of a write-once type. In addition, a track in a primary recording region of the DVD-R is wobbled at a specific pitch. In a DVD reproducing apparatus of the invention, an optical pickup (42) is moved in a direction toward the internal periphery of a DVD-R (10) until a wobble detector circuit (70) no longer detects in a tracking error signal (Ste) a signal component having a wobble frequency which is determined by a pitch relating to the wobbling of the track in the primary recording region of the DVD-R and a constant linear velocity. This seeks out genuine control information in the secondary recording region located on the side of the internal periphery of the DVD-R.

Fig. 1

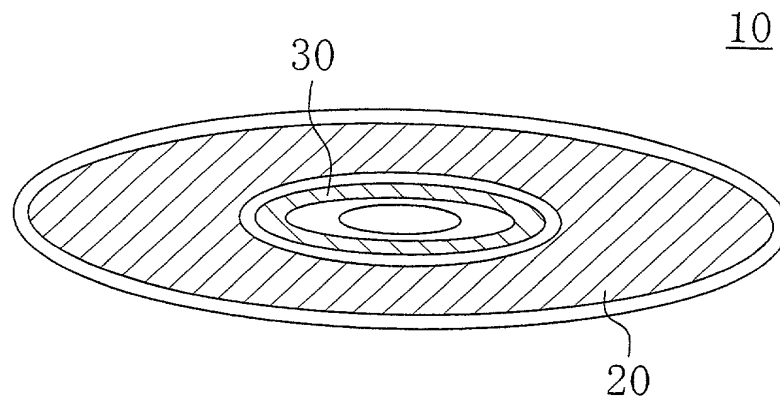


Fig. 2

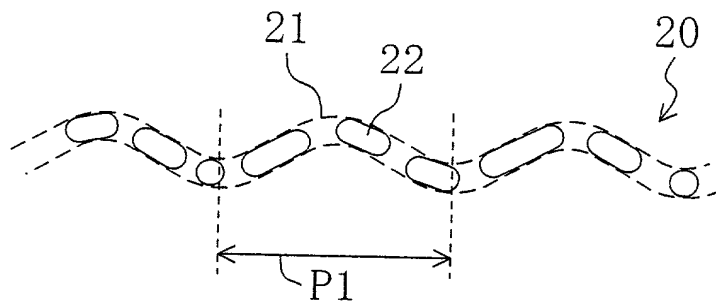


Fig. 3

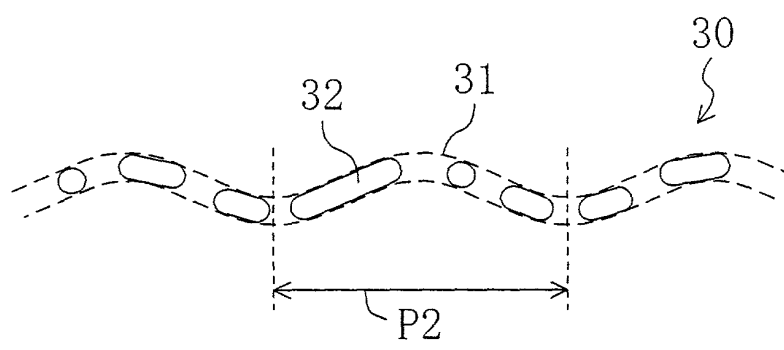


Fig. 4

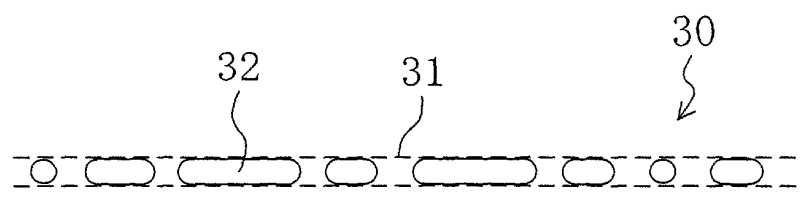
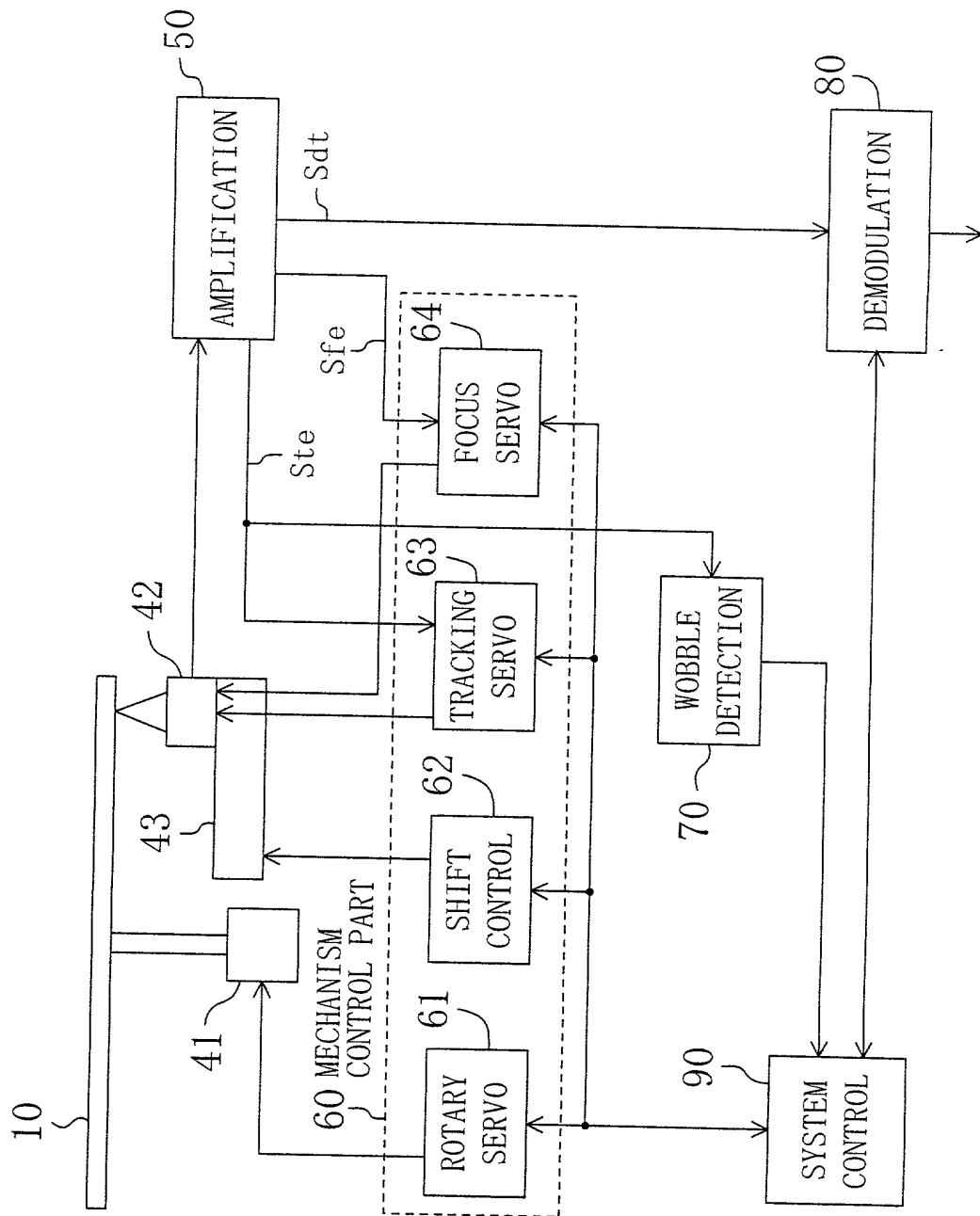


Fig. 5



4/5

Fig. 6

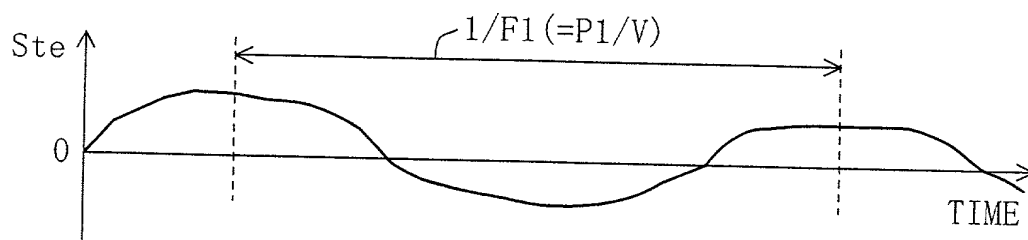


Fig. 7

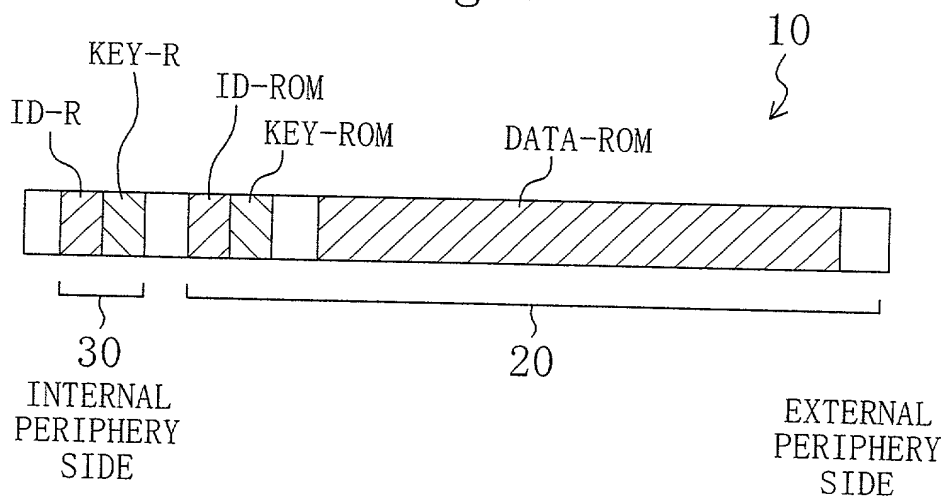
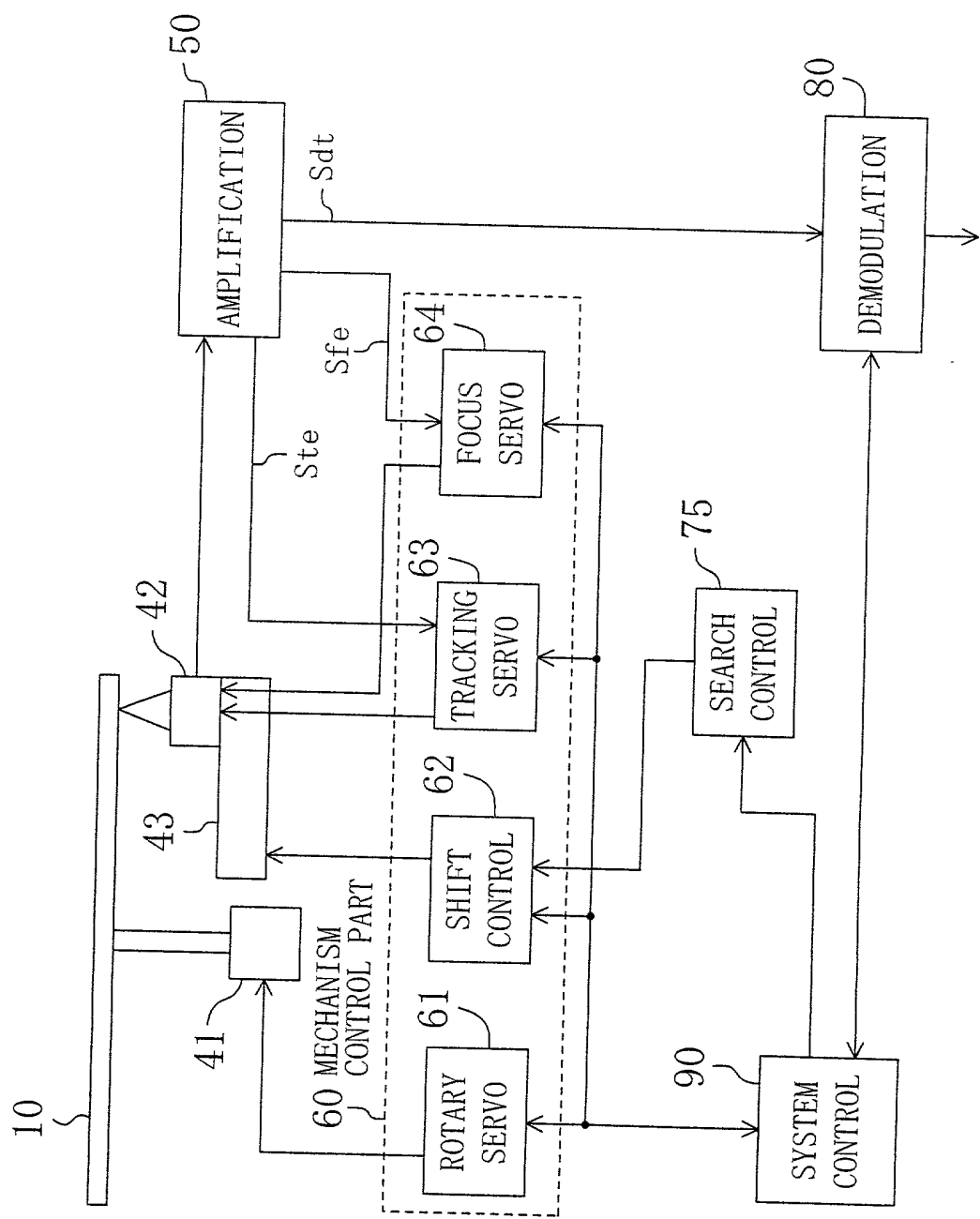


Fig. 8



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(Includes Reference to PCT International Applications)

Attorney Docket No:

As a below named inventor, I hereby declare that:

My residence post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

REPRODUCING APPARATUS AND RECORDING MEDIUM

the specification of which (check only one item below):

☐ is attached hereto.

☐ was filed as United States application

Serial No.

on

and was amended

on _____ (if applicable).

☒ was filed as PCT international application

Number PCT/JP99/04083on July 28, 1999

and was amended under PCT Article 19

on December 10, 1999 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations. § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international applications(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

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COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
Japan	10-213685	29/07/1998	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Japan	10-238180	25/08/1998	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
Japan	10-238181	25/08/1998	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

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PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS

STATUS (Check one)

U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED

PCT APPLICATIONS DESIGNATING THE U.S.

PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)		

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)

Daniel W. Sixbey, (Reg. No. 20,932)
 Charles M. Leedom, Jr. (Reg. No. 26,477)
 David S. Safran (Reg. No. 27,997)
 Donald R. Studebaker (Reg. No. 32,815)
 Tim L. Brackett (Reg. No. 36,092)
 Robert M. Schulman (Reg. No. 31,196)

Stuart J. Friedman (Reg. No. 24,312)
 Gerald J. Ferguson, Jr. (Reg. No. 23,016)
 Thomas W. Cole (Reg. No. 28,290)
 Jeffrey L. Costellia (Reg. No. 35,483)
 Eric J. Robinson (Reg. No. 38,285)
 Thomas M. Blasey (Reg. No. 33,475)

Send Correspondence to: Nixon Peabody LLP
8180 Greensboro Drive, Suite 800
McLean, Virginia 22102

Direct Telephone Calls to:
 (name and telephone number)

Eric J. Robinson
 (703) 790-9110

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

The undersigned hereby authorize any U.S. attorney or agent named herein to accept and follow instructions from MAEDA PATENT OFFICE as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorneys or agents named herein will be so notified by the undersigned.

FULL NAME OF SOLE OR FIRST INVENTOR

Kojiro OKAMOTO

INVENTOR'S SIGNATURE

Kojiro Okamoto

DATE

August 31, 2000

RESIDENCE (City, State & Country)

Osaka, Japan

CITIZENSHIP

Japan

POST OFFICE ADDRESS (Complete Address including City, State & Country)

4-24-24, Izumi-cho, Suita-shi, Osaka 564-0041 Japan

FULL NAME OF SECOND JOINT INVENTOR (if any) Hiromichi SHIMADA	INVENTOR'S SIGNATURE <i>Hiromichi Shimada</i>	DATE August 31, 2000
RESIDENCE (City, State & Country) Hyogo, Japan JPX		CITIZENSHIP Japan
POST OFFICE ADDRESS (Complete Address including City, State & Country) 13-24, Omori-cho, Nishinomiya-shi, Hyogo 663-8023, Japan		
FULL NAME OF THIRD JOINT INVENTOR (if any) Yoshihisa FUKUSHIMA	INVENTOR'S SIGNATURE <i>Yoshihisa Fukushima</i>	DATE August 31, 2000
RESIDENCE (City, State & Country) Osaka, Japan JPX		CITIZENSHIP Japan
POST OFFICE ADDRESS (Complete Address including City, State & Country) 6-14-C-508, Sekime, Joto-ku, Osaka-shi, Osaka 536-0008 Japan		
FULL NAME OF FOURTH JOINT INVENTOR (if any)	INVENTOR'S SIGNATURE	DATE
RESIDENCE (City, State & Country)		CITIZENSHIP
POST OFFICE ADDRESS (Complete Address including City, State & Country)		
FULL NAME OF FIFTH JOINT INVENTOR (if any)	INVENTOR'S SIGNATURE	DATE
RESIDENCE (City, State & Country)		CITIZENSHIP
POST OFFICE ADDRESS (Complete Address including City, State & Country)		
FULL NAME OF SIXTH JOINT INVENTOR (if any)	INVENTOR'S SIGNATURE	DATE
RESIDENCE (City, State & Country)		CITIZENSHIP
POST OFFICE ADDRESS (Complete Address including City, State & Country)		
FULL NAME OF SEVENTH JOINT INVENTOR (if any)	INVENTOR'S SIGNATURE	DATE
RESIDENCE (City, State & Country)		CITIZENSHIP
POST OFFICE ADDRESS (Complete Address including City, State & Country)		
FULL NAME OF EIGHTH JOINT INVENTOR (if any)	INVENTOR'S SIGNATURE	DATE
RESIDENCE (City, State & Country)		CITIZENSHIP
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